Adaptation of *Pseudomonas fluorescens* to Mojave Desert Soil: Role of Motility and Chemotaxis

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**Background**

*Pseudomonas fluorescens* is a gram negative, rod-shaped bacterium with one flagellum which confers motility. *P. fluorescens* also shows highly versatile metabolism and is found in diverse environments. In addition, this bacterium is used in several bioapplications that include biocontrol and plant growth promotion. Thus, understanding adaptation to diverse environments may improve the efficacy of *P. fluorescens* applications.

The Mojave Desert (Fig 1) occupies a significant portion of Southern California and parts of Utah, Nevada, and Arizona. Named after the Mohave Native Americans it occupies over 22,000 square miles in a typical Basin and Range topography. It is the smallest of the North American Deserts. The Mojave Desert receives less than 6 inches of rain a year, a generally between 3,000 and 6,000 feet in elevation, and can approach 120F in late July and early August (Digital Desert: Mojave Desert, 2007).

**Materials and Method**

**Soil Inoculations**
- Fill 20x150mm tubes with 5g soil
- Sterilize the tubes with soil
- Prepare LB media with appropriate antibiotics
- Grow Strains overnight on LB with appropriate antibiotics
- Inoculate broth with appropriate antibiotic and a single colony of appropriate strain
- Place in shaker for 24 hours
- Prepare inoculums, adjusted by OD = 0.01
- Inoculate 1ml into a tube containing 5g of soil per tube
- Measure Populations in soil by dilution plating (Fig 2)

**Results: Soil Moisture Content**

Measure Populations in soil by dilution plating (Fig 2)

**Soil Moisture Measurement**
To estimate soil moisture content, 1g of soil samples were taken from test tubes at the same time as for soil counts, dried for 48 h at 60°C and weighted again.

**Strains used in this Experiment**
The strains used in this study are Pf0-1, the wild type, Pf-2x (Fla+ Chem+), Pf-2xadnA (Fla++ Chem-), and aba18adnA (Fla++, Chem-) (Robleto et al., 2003). Soil populations were estimated by dilution plating on antibiotics.

**Results: Soil Colonization**

Days After Inoculation

**Soil count showed that Fla++ was decreased in dryer conditions.**

**Conclusion**

1) Motility may not be important for colonization of dry soil.
2) Super-flagellated strains are reduced when cells are exposed to soil that contain low moisture.
3) Flagellum may serve as a moisture sensing organ.

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**Bibliography**


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